

# THE CONTRIBUTION OF WITHIN AND BETWEEN VARIATIONS OF URINARY METABOLITE MEASUREMENTS IN PREDICTING CHILDREN'S PESTICIDE EXPOSURES

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**Background and Aims:** Organophosphate pesticides are employed in wide broadcast agricultural use, and while some are banned for use in households, off market use and residues from imported fruits and vegetables provide additional sources of exposure to children. At acute exposure levels, these pesticides are known for their neurological and neurodevelopmental effects and evidence is building for neurological affects with chronic low level exposures. Studies of children's pesticide exposures often use models utilizing single spot urine sampling and boost study power by increasing enrollment. However, this design has the central assumption of greater between subject than within subject variances. With the availability of repeated measures data over a 12-month period, this assumption can be tested.

**Methods:** Repeated measurements of urinary metabolite data from the Children Pesticide Exposure Study - Washington (CPES-WA) was employed for an analysis of dietary malathion exposure with linear mixed effects modeling including season, age, and gender as covariates and accounting for values below the limit of detection with maximum likelihood estimation.

**Results:** Within subject variance exceeded between subject variance by a factor of eight: 16 versus 2. Season is a significant contributor to the model at  $p < 0.001$ , while gender and age were not statistically significant covariates.

**Conclusion:** Analysis of components of variance for repeated measures showed eight-fold greater contribution of within subject variation to predicting malathion pesticide exposure levels than between subject. Therefore, repeated measures with fewer subjects may be a more efficient design for understanding children's pesticide exposure levels than single spot urine measurements involving a great number of study participants.